

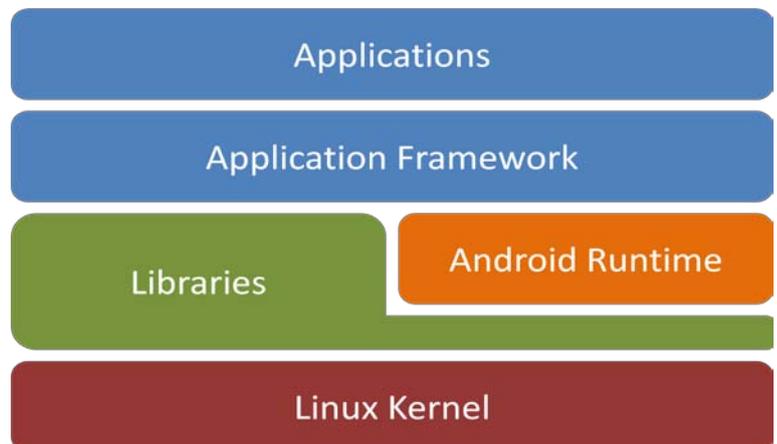
Master Thesis

Design and Integration of Real-time into the Android Platform

Nowadays, mobile devices can be found integrated for navigation and media in cars, receiving and processing different satellite system signals like GPS or GLONASS and are used for emergency calls. In many of these applications real-time capability implicitly plays an important role. But, only little effort is invested in providing or proving real-time capability of recent mobile devices. Therefore, the application of mobile devices is limited – they cannot match reliability or safety requirements. The UMIC Software Quality Initiative deals with software quality of current mobile devices, including real-time capability. As part of this project, the thesis discusses how real-time capability can be reached with the Android platform – a widespread operating system by Google for mobile devices. Providing a real-time open source mobile platform like Android to the community would enormously expand the field of activity of Android (e.g. safety in cars via Car2Car communication, monitoring and controlling in the field of industrial plants, or steering small mobile agents in several scenarios).

The thesis starts with a feasibility study on the different possibilities to bring real-time and the Android platform together (e.g. patching the underlying Linux kernel or adding a second kernel). Furthermore a corresponding design concept has to be developed, how the required real-time modifications can be integrated into the layers of the Android architecture (shown in the diagram). This part includes an evaluation of the Dalvik virtual machine, which the Android platform contains.

In the practical part of this thesis a real-time API has to be implemented and provided to the Android application developers. Based on the results of the first parts of the work the student worker has to decide, if the API will be realized as a Java interface using the Dalvik virtual machine or a native interface losing the sandbox mechanism. The practical work concludes with a case study of the resulting API, extending a reasonable application with some real-time functionality.



Course of Study

Diploma or M.Sc. Informatics or other Computer Science oriented Courses

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Acquirements

Experience in C++ and Java is mandatory. Knowledge of software architectures, the Java native interface, Android phones and real-time concepts is helpful.

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